

Claims:

1. A high-density circuit module comprising:

a first CSP having a lateral perimeter and upper and lower major surfaces and a first and a second edge, the edges delineating a lateral extent for the upper major surface;

a second CSP being in an inverted stacked disposition relative to the first CSP, the second CSP having a lateral perimeter and upper and lower major surfaces;

a heat spreader element disposed partially between the first and second integrated circuits;

a first radiating form element disposed at least partially along a first portion of the lateral perimeter of the first CSP, a portion of the first radiating form element being thermally connected to the heat spreader element;

a flex circuit connecting the first and second CSPs and disposed to place a first portion of the flex circuit beneath the lower major surface of the first integrated circuit and a second portion of the flex circuit above the second integrated circuit.

2. The high-density circuit module of claim 1 further comprising a second radiating form element disposed at least partially along a second portion of the lateral perimeter of the second CSP, a portion of the second radiating form element being thermally connected to the heat spreader element;

3. The high-density circuit module of claim 1 in which the heat spreader element has at least one thermally conductive mount formed on an at least one edge of the heat spreader element.

4. The high-density circuit module of claim 3 in which the at least one thermally conductive mount extends outside the lateral extent of the first CSP to a level below the lower major surface of the first CSP.

5. The high-density circuit module of claim 3 in which the at least one thermally conductive mount is in thermal communication with a heat absorbing mounting surface on a circuit board.
6. A high-density circuit module comprising:
 - a first CSP having a lateral perimeter and a first and a second edge, the edges bounding upper and lower major surfaces to delineate a lateral extent for the upper major surface;
 - a second CSP being in an inverted stacked disposition relative to the first CSP, the second CSP having a lateral perimeter and upper and lower major surfaces;
 - at least one radiating form element disposed at least partially along the lateral perimeter of at least one of the first and second CSPs, a portion of the at least one radiating form element being thermally connected to the at least one of first and second CSPs;
 - a flex circuit connecting the first and second CSPs and disposed to place a first portion of the flex circuit beneath the lower major surface of the first integrated circuit and a second portion of the flex circuit above the second integrated circuit.
7. The high-density circuit module of claim 6 further comprising a heat spreader element between the first and second integrated circuits.
8. The high-density circuit module of claim 6 in which the at least one radiating form element has voids therein to form heat radiating shapes in the radiating form element.
9. The high-density circuit module of claim 8 in which the heat radiating shapes are fins.
10. A high-density circuit module comprising:

a first CSP having a lateral perimeter and a first and a second edge, the edges bounding upper and lower major surfaces to delineate a lateral extent for the upper major surface;

a second CSP being in a stacked disposition relative to the first CSP, the second CSP having a lateral perimeter and upper and lower major surfaces;

a heat spreader element between the first and second integrated circuits, the heat spreader element having at least one thermally conductive mount extending from an at least one lateral edge thereof and thermally coupled to a heat-absorbing portion of a host system;

a flex circuit connecting the first and second CSPs and disposed to place a first portion of the flex circuit beneath the lower major surface of the first integrated circuit.

11. The high-density circuit module of claim 10 further comprising a form standard having a curved surface about which the flex circuit is partially wrapped.

12. A packaged high density integrated circuit module comprising a high-density circuit module as claimed in claim 1, encased in a hermetically sealed package.

13. A packaged high density integrated circuit module comprising a high-density circuit module as claimed in claim 10, encased in a hermetically sealed package.

14. A packaged high density integrated circuit module comprising a high-density circuit module as claimed in claim 6, encased in a hermetically sealed package.

15. A method of making a high-density circuit module comprising the steps of:

(a) placing first and second CSPs in non-contiguous positions on a flex circuit such that a first set of CSP contacts on a bottom major surface of the first CSP and a second set of CSP contacts on a bottom major surface

of the second CSP are both connected to respective ones of a plurality of flex contacts;

- (b) fixing at least one radiating form standard element at least partially along a lateral perimeter of at least one of the first and second CSPs;
- (c) fixing a heat spreader form standard element on a top major surface of the first CSP;
- (d) folding the flex circuit so that a top major surface of the second CSP is adjacent to the heat spreader form standard element.

16. The method of claim 15 further including the step of fixing adhesive between the top major surface of the second CSP and the heat spreader form standard element.

17. The method of claim 15 in which step (b) includes fixing a radiating form standard element at least partially around the first and second CSPs.

18. The method of claim 15 in which step (b) includes fixing with laminate adhesive.

19. The method of claim 15 in which step (c) includes fixing with laminate adhesive.